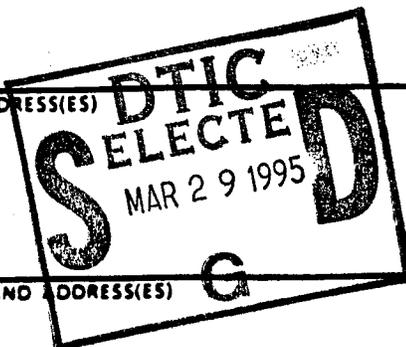


**REPORT DOCUMENTATION PAGE**

Form Approved  
OMB No 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 8, 1995	3. REPORT TYPE AND DATES COVERED Final 9/2/94-9/1/95	
4. TITLE AND SUBTITLE Ukrainian Summer School on Magnetism			5. FUNDING NUMBERS  DAAH04-94-G-0383	
6. AUTHOR(S) Dr. Irving Lerch			8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) The American Physical Society One Physics Ellipse College Park, MD 20740			10. SPONSORING / MONITORING AGENCY REPORT NUMBER  ARO 33148.1-PH	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Office P. O. Box 12211 Research Triangle Park, NC 27709-2211			11. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.	
12a. DISTRIBUTION / AVAILABILITY STATEMENT  Approved for public release; distribution unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The American Physical Society, in collaboration with the United States Physics Community and the Ukrainian Physics Community, have supported the development and execution of a series of high-level regional summer and winter schools in Ukraine. This is part of a larger program involving the physics communities of most of the newly independent states of the former Soviet Union. In continuation of this program, APS is participating in the organizing of the Summer School on Magnetism which will be held at the B.I. Verkin Institute for Low Temperature Physics and Engineering in Kharkov from August 29 through September 5, 1994. The fields to be covered in this school include the magnetism of low dimensional systems, magnetic excitations, magnetic domains, magnetic interactions, and ordering and critical phenomena and phase transitions.				
14. SUBJECT TERMS			15. NUMBER OF PAGES	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL	



19950327 164

TABLE OF CONTENTS

- I. Report from the Principle Investigator, Dr. Irving Lerch
- II. School announcement and report by Dr. V. Eremenko, Ukrainian Organizer
- III. Reports by ARO-sponsored participants:
  - Dr. August Maki
  - Dr. J.C. Slonczewski

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification .....	
By .....	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

" Best Available Copy "

**I. REPORT BY DR. IRVING LERCH  
PRINCIPLE INVESTIGATOR**

# The American Physical Society

One Physics Ellipse, College Park, MD 20740-3844 (301) 209-3200

Irving A. Lerch  
Director of International Affairs  
Tel: (301) 209-3236  
Fax: (301) 209-0865  
e-mail: lerchi@acflcluster.nyu.edu



## MEMORANDUM

**Date:** September 13, 1994

**To:** Judy R. Franz  
For distribution to the Executive Board

**Subject:** Travel Report, Ukraine Summer School Program

---

Report of visit of APS delegation to Ukraine for the purpose of examining cooperative programs with the Ukrainian Physical Society, to participate in the opening of the Ukrainian Magnetics School in Kharkov, to examine the general conditions affecting Ukrainian physics programs and to engage government, institute, university and UN officials in discussions on current conditions and future prospects for science in Ukraine.

## CONTENTS

CONTENTS .....	1
Preamble .....	2
1. Background .....	2
2. Travel Agenda and Itinerary .....	3
2.1 August 26 visit with Professor V. Nemoshkalenko .....	3
2.2 Visit with Professor V. Makara .....	5
2.3 Visit to the US Embassy and talks with Ambassador Miller .....	7
2.4 Visit to the UPS Main Office .....	8
2.5 Visit with the Director of the Boholyabov Institute for Theoretical Physics .....	10
2.6 Journey to Kharkov. Visit with the Director of the Institute for Low Temperature Physics and Engineering .....	12
2.7 Visit to the National Science Center, Institute of Physics and Engineering .....	13
2.8 Visit to the Kharkov Magnetics School (August 30) .....	16
2.9 Visit to the State Committee on Science and Technology .....	16
2.10 Visit to the Kiev Radio-Physics Institute .....	17
2.11 Follow-up visit with members of the Coordinating Board for UPS .....	18
2.12 Visit to the United Nations Office in Kiev .....	20
2.13 Meeting with the President of the Ukrainian National Academy of Sciences .....	21
2.14 Meeting at the Cybernetics Institute, Technosoft office .....	21
2.15 Visit to the Institute of Semiconductor Physics .....	22
2.16 Visit to ISF for talks with Viacheslav Shkarupin, Managing Director .....	23
3. Summary .....	23
APPENDICES 1 THROUGH 5 .....	24

*Preamble*

*On 25 August through 4 September, Judy Franz, George Gamota and I traveled to Ukraine for the purpose of participating in the opening of the Kharkiv Magnetics School and engaging in substantive talks with officers of the Ukrainian Physical Society (UPS), other senior members of the Ukrainian physics communities in Kharkiv and Kiev (representing both Academy institutes and universities), government and Academy leadership. George Gamota also journeyed to Lviv to participate in the School for Advanced Display Technology which he had been instrumental in promoting (funded by NSF). (A third school on Surface Chemistry and Physics was organized in Kiev beginning September 4.) The APS program is funded by both the Army Research Office and NSF, each of which approved \$8,000 to provide travel support for US invited lecturers, teaching grants for Russian and Ukrainian lecturers, School operating funds, and a notebook computer for the use of School organizers in the office of the UPS. In addition, the ISF provided additional funds to support the travel and subsistence of Ukrainian participants in the schools.*

*Talks centered on planning for future schools, journal distribution, scientific publishing in Ukraine, problems associated with the restructuring of the Ukrainian physics community, the tax status of outside grants, the relationship of the UPS to the Ukrainian Academy of Sciences and Academy institutes, and mechanisms for cooperating with the Kiev office of the UN on telecommunications infrastructure development: the Pilot Network Program. After discussions with the UN Kiev office, the program director for the ISF and the Coordinating Board for the UPS, agreement was reached to seek UNESCO/PAC support to assist the UPS in developing local network spines in Kharkiv and Odessa. In addition, the UNESCO/PAC will discuss providing additional telecommunications experts to assist the UN/ISF program of expert instruction on node implementation.*

**1. Background:** In 1993, APS included Ukraine in its program of support for regional summer and winter schools by requesting NSF funds for an optics school organized in Kiev. The Ukrainian Physical Society ultimately began planning a series of annual conferences centered on various institutes such as the Academy Institute for Low Temperature Physics in Kharkov (the principal organizers for the Magnetics School). APS subsequently submitted supplemental grant applications to both NSF and the Army Research Office to support one of 3 schools (the other 2 received funds from either or both ISF and other divisions within NSF).

APS has supported the development of a UPS secretariat to coordinate projects within Ukraine. The primary coordination responsibility falls on the Society's Coordinating Board which consists of the chairs of the various operating committees (publications, schools, financial, etc). The Society is volunteer driven with 2 staff employees who receive token salaries. There is an elected

President (Academician Baryakhtar, who is a Vice-President of the Academy) and 3 vice-presidents representing the principal regions of the country. Because of divisions within the country (western Ukraine is most nationalistic and looks to Western Europe, primarily Poland and Germany whereas Eastern Ukraine has a large Russian population and tends toward amity and accommodation with Russia), regional balance is essential. There is a great deal of suspicion in Odessa, Lviv and Kharkov concerning motives in Kiev and each city has organized its own active Society organizations. However, as this summer's programs demonstrate, such divisions can be overcome so long as the Society leadership exhibits sensitivity to regional interests. [It is important to point out that Baryakhtar holds a Chair in the Kharkov Institute of Physics and Technology. He was also the guiding authority in establishing the Society 5 years ago and gaining its acceptance within the Academy and the Institutes and Universities of the country. Thus, he serves as both founding father and symbol of common purpose.]

## 2. Travel Agenda and Itinerary:

### 2.1 August 26 visit with Professor V. Nemoshkalenko, Chairman of the Ukrainian Academy of Sciences Library Board and Director of the Institute of Metal Physics:

Professor Nemoshkalenko opened the discussion by citing the need for recognition of the Institute's journal, *Physics of Metals*, in the Citation Index. The English translation edition is published by Gordon and Breach and there are too few subscriptions to generate operating revenues. This became a recurring theme during our visit since numerous institutes publish journals and there is subject overlap. In the past, publication costs were borne by the Academy, but the Academy has all but ceased scientific publishing. Ukrainian publishing houses charge too much and the institute cannot possibly recover such charges from institutional or individual subscribers. This issue was a topic of discussion the following day during a visit to the Institute for Theoretical Physics.

Of greater priority to Nemoshkalenko and his staff was a proposal, published in English in the Ukrainian edition of the journal (volume 16, number 1, January 1994), for the construction of a new type of synchrotron radiation source. It was his contention that with Academy contributions, the source could be built for \$1 million whereas a similar source in the US would require \$10 million. We discussed a variety of potential funders to include the Nunn-Lugar funded International Science and Technology Center in Kiev (more on this below), the framework programs of the European Commission (Directorate-General XII for Science and Technology-- We promised to provide them with contact information). It was clear that the Academy viewed the proposal as important since the senior author was Victor Baryakhtar, Vice President of the Academy (and President of the UPS).

We urged them to seek multiple sources of funds to leverage the proposal with various funders. We will do what we can to see that they explore as many funding sources as is possible. This issue was also discussed with the US Ambassador in Ukraine (see below).

The economic collapse has slowed over the past 8 months with inflation running at about 5% per month, down from double-digits. This is largely due to the implosion of production which has now plummeted to a very low level. The ratio in value of the ruble/coupon (Russian currency/Ukrainian currency) is approximately 20 with the dollar currently purchasing 48,000 coupons (up from 600 coupons to the dollar at the end of 1992). Nemoshkalenko estimates that the living standard of Ukrainian physicists is 1/5 of that of 3 years ago. Professorial salaries currently average \$20/month and there is now little difference in remuneration at all levels within the institute. (It must be pointed out that subsidized housing is provided for about \$2/month and that while food costs are outrageously high compared to what it was even one year ago, there has so far been no major defections from the institutes.) The most serious problem is with young students who are turning to the professions as offering a more secure economic future. This issue was also pursued with the acting rector of the University in a subsequent visit.

The issue of taxation of foreign donated revenues to scientific programs was briefly discussed. Last year, at the inauguration of the APS program, then Premier Kuchma (the newly-elected President) signed a decree exempting APS and ISF grants from taxation. This is unevenly enforced and it was feared that the decree did not cover funds for our Summer School collaborations. To avoid difficulties, the Magnet School funds (\$4,000 for direct support) were carried as cash into the country for delivery to the School Director. However, we have protested to the Ukrainian Ambassador in Washington, Academician Bilorus, and to others and the issue was raised anew with both the President of the Academy, Academician Paton, and the Chairman of the State Committee on Science and Technology, Professor Ryabchenko (see below). Any funding in excess of 1 million coupons (approximately \$20) is taxed progressively so that \$100 (4.5 million coupons) is taxed at 50%. For 6 million coupons, 90% is taken by the government!

The Chairman of the Ukrainian Academy of Science Library Board, Professor Yuri Kucherenko then briefed us on the situation pertaining to scientific journal distribution in Ukraine.

The entire state budget for the procurement of all science journals published abroad is \$2 million. Physics journals are allotted 7% of the total. Thus, the APS and other journal distribution programs are the largest source of foreign physics journals in Ukraine. As of now, the APS Matching Membership program and the new Library Outreach program (whereby we provide 60 complete sets of journals to ISF for distribution, 10 of which are given to Ukrainian institutional libraries) have been important to our Ukrainian colleagues in overcoming the suspension of journal deliveries attending the collapse of the USSR. At long last, ISF funding and EC funding has been given to EPS to provide European journals and this will almost certainly alleviate the information squeeze.

However, as we suspected, the ISF distribution scheme is inferior to that of our recently concluded Matching Member program whereby we provided journals to various communities through trusted intermediaries on an as-needed basis. The ISF program provides complete sets to institutions whether they are needed or not. Thus, journals are being concentrated where they are not needed and are not provided where there is a need; and ISF does not permit the participating

institutions to provide for flexible delivery as was done with our earlier MM program and as will be done with the new EPS program. It will be necessary to see if these problems can be ameliorated through discussions with ISF staff.

Not discussed was the smaller AAAS program funded by the MacArthur Foundation which distributed 4 additional complete sets of APS journals to central, Academy and university libraries. Most of these journals repeated APS and ISF deliveries and will be suspended.

These problems aside, it was clear that APS journals are widely available to the Ukrainian physics community.

However, books, monographs, conference proceedings and other forms of literature are not being received. We urged them to communicate with conference organizers and publishers to obtain courtesy copies of such publications. Some means should be explored for meeting this deficit.

Nonetheless, they believe that the profound transformations occurring within Ukrainian Society portend ill for the scientific community. Nemoshkalenko and Kucherenko see the crisis in science continuing during and even after economic recovery. In their view, the government seems disinterested in supporting basic research. It is clear that their understanding of the situation is narrow and parochial and they are disinclined to develop their own initiatives. They are apparently most at ease with the old system of Academy subsidies and they do not appreciate the new regimes instituted by Ryabchenko, Chairman of the State Committee of Ukraine on Science and Technology (see discussion below) and forced on the Academy by the exigencies of the financial crisis. The attitudes of this leadership are in sharp contrast to some other institute directors (although the old guard appear to be the majority). It is best summed up by the response of many of these institutes to the early emergency grants programs of APS and ISF: when the call went out, they largely ignored it, thinking that it was of little value or interest. When they recognized their error it was too late.

## **2.2 Visit with Professor V. Makara, Acting Rector, Kiev University (National Taras Shevchenko University of Kiev):**

The University recently celebrated its 160th anniversary. It is one of the oldest in the country and is the largest "classical" university (as opposed to the technical and medical universities). It has recently acquired the status of a national university unique among the nation's universities, and is directly funded by the government administration and not the Education Ministry. It therefore has autonomous, self-governing status.

There are 10,000 full-time students and 2,000 faculty of which 300 hold the title of Doctor of Science and are full professors.

As of this year, a multi-stage degree system similar to that in Russia, has been inaugurated with the following features:

- 4 year study program leading to the bacculaureate.
- A subsequent 1 year study program leading to certification as "specialist."
- The better students may then proceed to a Masters Degree following a final year of study.
- The equivalent of the Ph.D. degree can be awarded anytime after an additional 3 years of study after receiving the Masters Degree or the specialist diploma.

On average, doctoral candidates complete their degree 5 years after the core 6 year program. Those who continue on and join the faculty are then subject to a system similar to that in Germany whereby those in mid-career qualify for the "Doctor of Science." Approximately ¼ of all university instructors continue to their science doctorates.

Many students with specialist diplomas elect to do their doctoral research in an Academy institute although the disparity between institutional and university research is not as severe as it is in Russia. (Nonetheless, Institute research is far more extensive--including the large facility programs--and accounting for 60% of all infrastructure funds and more than half of all operating funds.)

Of the 100 Academy institutes in Ukraine, 25 are located in and around Kiev. Thus, many institute instructors teach at the university. Roughly 100 institute academicians teach in the university as visiting professors. This enables the institutes to gauge student performance and to recruit likely candidates for research positions and doctoral studies. But there is no reciprocity. University faculty are not often invited to do research in the Academy institutes as is sometimes the case in Russia (although this may be changing as institutes and university faculties seek new collaborations).

The faculty carries a heavy teaching load. Full professors give as much as 700 hours of lectures per year, averaging approximately 600 hours. This translates into about 150 lectures per year.

There are 18 colleges (faculties) in the University of Kiev. Some of these--the most interdisciplinary--are "institutes." An example is the Institute of International Relations and International Law.

In contrast to the Academy institutes, university science has deteriorated with research staff reduced by half owing to the economic crisis. Prior to independence, 2,500 researchers worked in the University and many of these had ties to industry (most with the military-industrial complex in Russia). Thus these workers were supported by "soft" money and they were vulnerable to the inevitable cutbacks. Subsequent to the breakup of the USSR, these military-industrial ties were lost. The Ukraine government did redirect some funds from the state budget to the university to support some of these researchers, but this went largely to salaries and pensions. There were no increases in operating or procurement funds. Thus, whereas the theoretical groups were not adversely affected, the experimental groups were hard hit.

In sum, while the numbers of students and faculty remain the same as before the crisis, those researchers on "soft" money are losing out and being forced to leave.

The University is seeking sponsors to provide \$1 million to finish a building and research facilities and is discussing prospects for funding with IBM-Europe. They have received funding from international foundations, notably the Soros foundations (the Ukraine Renaissance Fund, ISF, etc). It was pointed out to them that they could invigorate their research programs by inviting faculty from abroad (the NRC and NSF visiting scientist programs, for example). They were encouraged to pursue this approach.

The chairman of the chemistry department later confided that he saw no value to inviting colleagues for stays since the department had no reagents or funds to purchase chemicals. It was clear that this department was passive and displayed little inclination to take the initiative and seek support on its own. There is apparently a fundamental failure to understand the nature of their reduced circumstances and the need to take matters into their own hands. The end of ministerial patrimony has not been appreciated and met with the initiative required.

### **2.3 Visit to the US Embassy and talks with Ambassador Miller and members of his staff:**

The general economic and political situation in Ukraine was discussed. Of particular interest was Ambassador Miller's contention that the long-delayed International Center for Science and Technology would soon be open for business. We were not unmindful of the recurring promise of this use of Nunn-Lugar funds but were encouraged that the prospect had brightened.

The Ambassador explained that the decline in inflation from over 40% per month to just under 5% was more due to the collapse in productivity than to any successful economic policy on the part of the government. Clearly more investment from the West was needed and the one or two automobile plants being set up, while salutary, were primarily engaged in assembly rather than the manufacture of goods. Miller's staff stated that the economy badly needed to develop and exploit new products such as electric or gas automobiles.

There was also concern about the attitude of parliament and the political polarization in the country.

In so far as the scientific establishment was concerned, the Ambassador strongly supported the State Committee for Science and Technology which had initiated a competitive grant program. There is, however, general agreement that the bloated scientific structure of the Academy institutes would have to be radically reduced.

We discussed the situation with respect to Chernobyl to include the paucity of international funding for study and abatement. The Ambassador indicated that there would be a G-7 ministerial meeting on the subject on the 4th through 6th of September. We asked whether an APS

declaration pointing to the need for support for studies and steps to stabilize the Chernobyl installation (including reactor upgrade and power procurement) would be welcome and he indicated that such a statement would be very useful. It is doubtful that such a statement would be forthcoming in time for this meeting, however, since the Executive Board will not meet until after the conclusion.

At the end of our discussion, the science attache, Steven Miller (no relation to the Ambassador) provided State and DoE contacts in order to further the exchange of information on Ukraine.

#### **2.4 Visit to the UPS Main Office in the second campus of Kiev University:**

Meetings were arranged with various officers and committee chairs by Oleksandr Slobodyanyuk, Chair of the UPS Coordinating Board Bureau and Vladimir Andreev, Executive Secretary of the Coordinating Board Bureau (the Board serves to coordinate the activities of the various committees and to serve as Society secretariat as indicated above). The purpose of the meeting was to acquaint the APS delegation with the various programs of UPS and to discuss certain elements of the collaboration between the two societies.

Participants in the meeting included Professor Tikhonov, Chair of the Ukrainian Advisory Committee on Grants and Scholarships (which served to collect and forward emergency grant applications), Professor Valakh, Chair of the Committee on Schools and Conferences, Professor Kalchenko, Editorial Commission, Professor Sosenko, Acting Director of the International Advanced Research Laboratory (a proposed program of the Society), Mrs. Usenko, Deputy Director of the Center for English Language Training of Gifted Young Physicists (secondary school) and Professor Penkevich, Chair of the Commission on Young Physicists Problems.

As stated, UPS was organized 5 years ago by physicists in Kiev and Kharkov to develop new relations within the Ukrainian scientific community by promoting innovative means for the exchange of information. It was registered by the government in 1990, the first non-governmental organization to be so recognized. Its current constitution is patterned on that for APS and is in process of revision to provide for the unique organizational requirements of the Society. An extensive subset of by-laws is in preparation. The members take great pride in pointing out that Society officers are elected and not appointed for life as has been characteristic of Soviet academic institutions and academies.

With the inception of the APS program and the signing of a Reciprocal Member Agreement between APS and UPS in 1993, the APS grant and journal and equipment donation programs were exempted from taxation in a decree authorized by then President Kravchuk and signed by then Premier (and current President) Kuchma. Unfortunately this decree is not now recognized to cover funds remitted in support of regional summer schools and travel grants. And tax law is difficult to change owing to the need for tax revenues in the country. Decreasing tax revenues have led to decreasing state services which in turn tends to depress revenue collections.

The Society has 1,753 members and between 50-100 have email addresses. In actuality, most Ukrainian physicists have access to email through their universities or institutes.

The discussion of the mechanism for organizing schools and conferences stressed the need for UPS to provide for early and timely planning. For 1993 and 1994, school organizing committees and the UPS often began planning so late as to jeopardise recruitment of funds. It was pointed out that plans had to be in place from 12 to 18 months before the school commencement date.

The Coordinating Board will undertake the drafting of a plan to assure timely organization and submissions for support. This will include the development of institutional "partnerships" with the West to develop more permanent mechanisms for the support of important schools. They recognized the need to develop bridges to the West with more affiliations. They also face the unique problem of achieving some kind of geographical balance within Ukraine because of regional political considerations (in sum: Western Ukraine is highly nationalistic whereas Eastern Ukraine favors close ties with Russia).

The UPS also wishes to promote interdisciplinary ties with other scientific groups inside Ukraine in order to develop interdisciplinary collaborations. Thus, in 1994, the 3 conferences in Kharkov, Lviv and Kiev are actually patterned after the Gordon Conferences. They wish to extend this with a system of schools with Ukrainian venues.

We encouraged them to organize a long-term international organizing committee to explore the following:

- Listing of potential funding sources and the tactics for pursuing funds.
- The acquisition of institutional and individual collaborators in the West.
- The development of an action plan to implement the Society's goals.

The Society informs its members and friends of community news, programs, and allied information through the publication of, "Physical Messenger." Subscriptions are sold to organizational libraries for 100,000 coupons (\$2), to Society members for 30,000 coupons (60¢) and to non-members for 50,000 coupons (\$1). The editorial board has sought reprint rights from numerous editors of foreign publications including *Physics Today* and *APS News*.

Because of the need to insure that future generations of Ukrainian Physicists are facile in English, the Society has championed a program for young physics students at the Physics and Mathematics Lyceum for Gifted Children. The program was developed by Mrs. Usenko who is a physics teacher in the department chaired by her husband. Funding for the program was obtained from the Soros Ukrainian Renaissance Foundation.

Mrs. Usenko developed a manuscript with both English and Ukrainian text which introduces physical principles and terminology in English. The students then continue their studies with increasing amounts of English and recite in English. The manuscript will be published as the

official text for this programs with funds provided by the Renaissance Foundation.

In general, the consensus was that these students probably did better than their counterparts undertaking more traditional courses because of the intensity of the instruction and the need of students to think about problems in different ways.

The Society is deeply involved in preparing and supporting students selected to represent Ukraine in the International Physics Olympiad. In each town and rural district, teachers select candidates who take regional examinations. The best of these move on to provincial examinations where the champions take part in the all-Ukraine contest. The 5 top finalists are selected for the team and from 1 to 2 alternates are also selected.

The team then undergoes 2 weeks of training before taking part in the international contest. Their best finish so far was 3d place in 1992. In 1993 they finished 7th and in 1992 they finished 6th, ahead of the Russian team.

At the conclusion of discussions, a notebook computer with peripherals and software was presented to the Slobodyanyuk for use by the Coordinating Board to support the organization and administration of the schools.

**2.5 Visit with the Director of the Boholyabov Institute for Theoretical Physics of the Ukrainian Academy of Science, Professor Olexij G. Sitenko, and the Deputy Director, Anatoly Zagorodny (August 27):**

Professor Sitenko is the Editor-in-Chief of the Ukrainian Physical Journal and Chairman of the Kiev Physical Society. We were aware that his principle interest in seeing us was to discuss the fate of the Journal and difficulties that the Institute was having with its scientific publishing. We had in fact received an appeal for support from him several months ago and in response, had drafted a letter for Burton's signature asking the ISF to consider providing support for FSU publishing operations.

The Institute has 100 scientists organized in 10 departments (field theory, mathematical physics, quantum physics, nuclear theory, solid state, biophysics, plasma, quantum electronics, computer simulation and high energy).

Professors from the institute lecture at Kiev University and provide training for students in the institute. Students are selected in their 3rd year. Currently the Institute has 20 pre-baccalaureate students and 20 graduate students.

Four years ago the Institute organized the International Center for Physics, to plan and administer conferences and seminars. Beginning in 1971, they had organized a series of international conferences, the next scheduled in 1994 on hadron physics.

Aside from the journal, the institute has published texts, conference proceedings and monographs. They attempted to publish a translation journal for the Ukrainian Physical Journal but ran into intractable funding difficulties owing to the closing of Academy publishing operations and the cost of Ukrainian publishing houses. They attempted to interest European publishers and the AIP but found no interest.

The journal is very broad, covering all of physics, and is therefore subject to competition from more specialized publications put out by institutions with greater resources.

They were warned that the proliferation of journals makes it increasingly difficult for libraries to select small publications for inclusion in their subscription lists. Nonetheless, we acknowledged the desirability of national communities to develop their own unique "voice." It is clear that the UPS would like to have the Journal as the Society's publication although they realize that in its present form it is flawed. They have suggested that the Journal be reorganized into specialist editions so that specific fields would be highlighted on a rotating schedule.

In addition, Sitenko pointed to the fact that the advisory and editorial boards were international and not constrained to institute members. He also stressed that he actively sought manuscripts from many institutes and from abroad.

Equally serious from Sitenko's view was the difficulty that the Institute was having publishing books and other materials. For example, he has completed the manuscript for a text on plasma theory which requires approximately \$3,000 to publish by the Academy. The Journal must be printed in runs of 1,000 at a cost of \$2,000: \$2/copy! However, there is a publisher in Lviv who will do the job for 50¢/copy. Still, even this exceeds their available budget. The Institute has a small group that has prepared an excellent Ukrainian-English technical dictionary which is badly needed.

And despite the fact that other institutes in Ukraine publish journals and books (for example the Kharkov Institute of Science and Technology--see below), Sitenko sees as his only solution the development of a publishing operation within the Institute. He already has a small group which performs computer compositing and he has developed the outline of a proposal seeking \$50,000 to procure printing and binding equipment. He estimates that in-house publishing of the Journal will reduce the press run to \$200 or 20¢/copy.

At present, the only revenue he receives from the journal is \$20 per run (mostly from institutional subscribers).

We suggested that if the ISF Board responds favorably to Burton's letter suggesting that a modest program be developed to promote such publishing programs, that they prepare a proposal stressing the following elements: institutional resources devoted to the publication (without underestimating the value of their commitments)--editorial staff, compositing, space, operations costs, equipment, Academy support, revenues, etc.

They were warned that this commitment was a double-edged sword, consuming Institutional resources in the face of proliferating and competing institutional publishing programs. It was also essential that they make a complete and objective survey of the costs. But perhaps most important, there is a lamentable tendency among the institutes to remain closed to collaborative ventures, each interested in pursuing its own independent course. Thus, each institute tries to develop its own proprietary publishing base. This is untenable and something must be done to promote open collaboration. It is not possible for the country to continue to promote these independent authorities and their redundant programs for much longer.

## **2.6 Journey to Kharkov. Visit with the Director of the Institute for Low Temperature Physics and Engineering, Professor Victor V. Eremenko and his staff (August 29):**

(Professor Eremenko is also Director and Chair of the Organizing Committee for the Magnet School.)

The Institute was organized in 1960 (by staff who broke off from the Kharkov Institute of Physics and Technology), at the onset of the USSR space program. It was organized as a small institute to study the fundamental aspects of low temperature physics in much the same manner as Kapitza organized his institute in Moscow. The Institute's first Director, Boris Verkin, recognized that the Academy would not provide much in the way of resources to support the small venture and so he contacted the Space Institute in Moscow and developed several collaborative programs.

Thus, the Institute had remained independent of the Academy, deriving its support from a lucrative association with the Space Institute and defense contracts.

The Institute employs 60 Doctors of Science and 300 Candidates organized into divisions of physics, mathematics, technology and applied physics. The mathematics division was organized because Kharkov University's mathematics department had been disbanded in 1949.

The mathematics division publishes a single multiple-language edition of the Journal of Mathematical Physics, Mathematical Analysis and Geometry in Russian, Ukrainian and English. They publish an English translation edition with AIP which appears contemporaneously as the original language edition. The multiple language edition is printed in runs of approximately 600 with 500 distributed within Ukraine and 100 delivered to Western Europe. The AIP run is approximately 300 with 50-70 distributed in Europe. About 100 of the original language journals are retained for distribution free of charge.

The Institute wishes to publish a Ukrainian language edition but realizes that this would be impracticable.

The Institute is considered to have one of the best and most complete physics and mathematics libraries in Ukraine. However, many of the journals are xerox copies, especially of the *Physical Reviews*.

The physics division has a staff of approximately 500.

The Applied physics division, which was devoted to both space and military projects, formerly had a staff of 1,365 but is now down to approximately 420-450 employees. It is converting its operations to developing consumer-related technologies and materials. It is focussed on such products as medical materials and devices, cryogenic manufacturing processes such as the conversion of used tires to road surface materials and the fabrication of diamond powders for the hardening of surfaces.

But the policies of the new government may undermine these efforts at military conversion. President Kuchma was the former director of a major missile manufacturing plant (Ukraine manufactured both long and short range ballistic missiles). He has reopened the plants in order to manufacture missiles for both Ukrainian armed forces and foreign export, to gain currency. Many other former defense plants hope for the same and there are fears that the government will divert conversion funds.

The Institute has 2 pilot production plants for the manufacture of equipment. One is located on the grounds and employed as many as 500 people in 1989. It now has a staff of 150-200. The other plant is located 60 km outside of Kharkov. The local plant produced cryogenic systems for the space program (50-60 degrees Kelvin) and used for the production of solid gasses. The remote plant was planned for 1,200 employees and was supposed to provide systems for the military and space programs. Lack of military orders and cutbacks in the space program caused the collapse of these plans. The plant currently employes approximately 20 staff to manufacture special instruments designed for remote sensing, measuring the properties of materials in space and similar equipment. It currently services contracts for the German component of the European Space Agency.

The physics division employs 350 and has pursued research in fundamental superconductivity and developed new fields such as high-T<sub>c</sub>, weak superconductivity, etc. It developed the new technique of point contact spectroscopy. The Institute has no programs in semiconductors (there is a semiconductor institute elsewhere).

The Institute still maintains an association with the Space Research Institute in Moscow since it is dependent upon the Institute for services and equipment. However, their only source of liquid Helium is Russia (even though, ironically, Ukraine makes the refrigeration equipment). The main difficulty in dealings with Russia is the problem of converting coupons to rubles.

Unlike many of the other institute leadership, Eremenko and his staff are dynamic and upbeat, developing and implementing innovative programs to insure viability. They have not hesitated to cut staff and seek resources from different ventures and associations. There is an air of at least guarded confidence that work will continue and that the institute will survive.

## **2.7 Visit to the National Science Center, Institute of Physics and Engineering in**

**Kharkov, for talks with Professor V. Zelensky and Institute staff:**

The IPE is the oldest Academy Institute in Ukraine and one of the largest. One of the first branches of the UPS was organized there.

Founded in 1928, it was affiliated with the Leningrad Institute of Physical Engineering, the Ioffe Institute. Landau worked in the Institute until the onset of WWII, and many other famous physicists worked there: Lipschitz, Bose, Veck, Chudnikov, etc. The IPE has a tradition of Western affiliations and played a seminal role in the development of solid state and other modern studies.

After WWII, the IPE developed new directions for research. Since independence, the Institute became the first Ukrainian National Center. This provides IPE with some autonomy and permits it to interact with the Academy on a privileged basis. It is able to develop independent collaboration and programs with industry and universities and this has given it needed flexibility during hard economic times when Academy support is flagging.

Also after WWII, it acquired responsibility for a large nuclear weapons program. However, since Ukraine has officially chosen non-nuclear status, the cutbacks in weapons development has deprived the Institute of major funding. In fact, before the dissolution of the USSR, only 4% of the Institute's activities were centered on Ukraine. Thus the flexibility and autonomy conferred by its designation as a National Center is essential if the Institute is to survive.

With its change of status, the IPE has begun to reorganize its departments and divisions into a conglomerate of subordinate institutes. The Presidential decree designating the IPE as a National Center specified that the Institute must devolve its activities onto several relatively independent institutes. The Institute of Plasma Physics, with its active sellerator development program was the first (and so far only) institute to be organized. Zelensky estimates that in 2-3 years there will be 4-5 such institutes. As of now, the departments have received increasing independence in preparation for the reorganization of IPE.

The Institute has 4,000 employees and provides living facilities for 15,000, to include housing, medical facilities, shops and other infrastructure. It also operates the Department of Physical Engineering of Kharkiv University. It operates a vacation camp in the Crimea but now finds that all of these peripheral obligations are difficult to support.

One-quarter of the Institute's facilities and activities are located in the city, the remaining 3/4 are in its main campus outside of Kharkov. Its principal areas of research and development are as follows:

- Solid state and materials physics--20% of staff and 39% of the research budget are devoted to this division which consists of 8 departments, 37 labs and employs 16 Doctors of Science and 128 Candidates. The division

collaborates with the Institute for Low Temperature Physics which was, until 1960, a separate department of the division. We have since learned that the separation was not at all amicable at the time and represented the impact of the entrepreneurial and political mechanisms that groups within powerful institutes resorted to in order to gain independence. This division collaborates with the Institute for Radio-Astronomy, which also separated from its parent. Its many research activities include radiation interaction with matter and radiation damage studies, the physics of material strength and plasticity, reactor materials, surface physics, fundamental and applied superconductivity (both low and high  $T_c$ ) and ultra pure metals and new construction materials.

- Nuclear physics, electromagnetic interactions and accelerator physics--13% of staff and 25% of the research budget support 6 departments, 21 labs, 19 Doctors of Science and 85 Candidates. This division ran the large LINAC which was retired from operation 2 years ago. It studies photon and electron interactions up to the 2.2 GeV region, quantum electrodynamics, interactions in crystals and accelerator physics. Its design group was a major force for the engineering studies of electron accelerators but is now reduced to providing injector components and industrial processing designs. A major responsibility was the development of nuclear methods to analyze the structure of materials. It has been attempting to develop its industrial and inter-institutional collaboration.
- Plasma physics and controlled fusion--This is the first of the affiliated institutes. It is a much leaner and, perhaps, more efficient organization with 7% of the staff and 13% of the budget supporting 5 departments, 19 labs, 6 Doctors of Science and 35 Candidates. Since Tokamak studies were assigned to Russian institutes, fusion studies in the Ukraine are done on stellerators. The Institute has concluded studies on its first 2 generations of stellerators and is in the process of commissioning its third. The new stellerator is on its test bed and low-plasma field-mapping studies are underway. The Institute hopes to fire up its first high-density plasma studies in the Fall of this year. The Institute also studies interactions of the plasma with solid state. The staff prides itself on achieving heating of high-density plasmas with high efficiency and supports intensive studies with plasma diagnostics.
- Physics of high currents, plasma-material interactions--this division has 6% of staff, 12% of budget and is organized into 5 departments and 20 labs with 20 Doctors and 46 Candidates. It is primarily interested in beam-plasma instabilities and the development of electronics.
- Physics and engineering for heavy ion accelerators--the division has 6% of staff, 11% of research budget, and is organized into 3 departments with 9 labs. Its research staff has 3 Doctors and 24 Candidates. This division was invested with responsibility for the development of the largest accelerator

for production of photons to investigate materials. The project was suspended for lack of funds.

- Theoretical physics--this division has 2 departments and 8 labs with 19 Doctors and 51 Candidates. Its studies include particles, quantum fields, nuclear interactions, solid state and plasma physics.

IPE has a tradition of inviting researchers to participate in its program but it now has no funds to support them. Thus, Zelensky feels that collaborative programs are impossible to maintain. Invited collaborators can receive no money (although he admitted that theoreticians do manage to get together). They have a synchrotron source collaboration with the Institute of Condensed Matter Studies in Kiev, although it's hard to imagine with what vigor with this collaboration is pursued. IPE has also supported the Kiev Institute of Nuclear Studies which currently has the main responsibility for the Chernobyl investigation. Unfortunately, these studies are not supported by the UN (which is the only source of funds for such studies). The Institute requested \$600 million but received only \$6 million (overall responsibility for Chernobyl in the Academy of Sciences resides with Baryakhtar who chairs the Academy's Chernobyl committee).

At present, the Academy has study results compiled in a 1000 page document. Springer Verlag requires \$15/page to publish the book in Russian and the Academy is seeking \$10,000 from outside funders. A copy of the 24 page index will be sent to me via email.

When asked about the Institute's attempts to secure funding from extranational sources (INTAS, ICST, etc), Zelensky reported that the interim director offered no more than \$50,000 to all of Ukraine. While the discussion apparently continued out of courtesy, the entire concept was dismissed by Ukrainian authorities as a useless enterprise.

### **2.8 Visit to the Kharkov Magnetics School (August 30):**

The school was convened in the holiday hotel Vesna on the shores of a reservoir south of Kharkov. Approximately 65 researchers attended the opening session of the school which included opening remarks by the School's Director, Victor Eremenko, a welcome and salutations by Judy and a formal lecture by Professor Baryakhtar. After the opening session, we had lunch with some members of the faculty and briefly discussed future directions for the program.

Judy and I delivered \$4,000 in cash to Eremenko who provided me with a full budgetary breakdown of the School's expenses to include receipts for expenditures already incurred.

### **2.9 Visit to the State Committee on Science and Technology and talks with the Committee Chairman, S. Ryabchenko (Kiev, August 31):**

The visit with Ryabchenko was brief and hurried, lasting less than 30 minutes, owing to the sudden scheduling of a Presidential meeting of government ministers. Present at this meeting besides the APS delegation was Baryakhtar, Slobodyanyuk, Andreev and a Committee staff

member, Yampolsky.

Ryabchenko emphasized that his Committee bore responsibility for administering the program of support for 8 priority areas: agriculture, health, materials, etc.

It was clear that Ryabchenko was well informed of the status of international programs currently evolving to support basic and applied sciences and military conversion. It put into stark relief the apparent lack of information among the scientific community and, as it turned out, a general ignorance shared by Academy officers, institute staff and university faculty. Why there should be such a disparity was not addressed owing to the press of time. It was necessary to press Ryabchenko with occasional questions to staunch the one-sided flow of information.

Ryabchenko was the first government officer to introduce a competitive grants program almost 2 years ago although, as stated, the funds are too small at this stage to seriously affect the structure of programs.

**2.10 Visit to the Kiev Radio-Physics Institute and talks with the Institute Director, Professor Nicolai Nahodkin (who also chairs the government's advisory Science Council):**

Unmentioned in talks with Ryabchenko was the National Science Council, presumably a board of distinguished scholars who serve as volunteer advisors to the Committee on Science and Technology. Nahodkin stated that the Council members were selected from among scholars nominated by the institutes and universities (nominations were solicited by the State Committee).

All nominees then met and elected a 137 member Council. The work of the Council is done by a 15 member bureau elected, in turn, by the Council. Care was taken to select Council and bureau members who did not come from the governing hierarchy and who would serve as individuals and not as the representatives of their organizations.

The Council's job is to formulate priority areas for government support and was responsible for naming the 8 areas listed by Ryabchenko. In addition, the bureau oversees the State Committee's program and budget and meets with Ryabchenko and his staff 2 times weekly. Thus, Ryabchenko's failure to mention the Council and its bureau and the apparent lack of information in some areas exhibited by Nahodkin concerning international programs raised questions in our minds as to the actual role played by the Council.

In addition to the Council, the President has an advisory body with almost the same people. Owing to the peculiar relationship between head of government and head of state, this in effect gives these advisory bodies the dual role of giving input on budgetary allocations and overseeing the administration of programs.

Parliament develops its understanding of science policy through the parliamentary committee on science and technology chaired by Storigko (with whom we met in early August during his visit to

Washington, DC).

Nahodkin pointed out that 60% of the State Committee's budget is allocated to infrastructure (mostly for Academy institutes) and only 40% is distributed as direct grants. In effect, this means that 50% of all Committee funds goes to the Academy institutes and only 12%-17% of the total budget goes to universities. Of the 40% distributed as competitive grants, only 6%-7% goes to university researchers.

When asked about the status of Academy-university collaboration, Nahodnik responded that while there were a few such programs; universities are not in a position to compete for the larger grants since large-scale research has traditionally been done in the institutes. This serves to bar collaboration. The issue of why the institutes do not encourage university scholars to participate in institute research was not discussed.

The Council develops its list of areas for support by surveying community needs through a system of general proposals. The second step is then a request for proposals in specific areas presumably defined during the first stage.

In the last round of proposal evaluations, 2,000 projects were funded in 702 areas. In the areas of fundamental and applied research, there are 9 generic areas: physics, math, biology, chemistry, history, philosophy, economics, industrial technology, and another which failed to make it into these notes.

Five thousand physics proposals were submitted of which 900 were financed. On average, projects received 30 million coupons (\$600) to a maximum of 400 million coupons (\$8,000).

Nahodnik was asked about the ISF program in Ukraine. Former President Kravchuk had committed \$2.5 million in matching funds to the ISF program for 1995 and it is not known whether President Kuchma or parliament will honor this pledge. The government is preparing a recommendation which will be made public in about 2 weeks. He is aware that there is no money in the program for new projects after the current concluding round of grant announcements.

When asked about duplicate funding, he responded that the general policy was that no research may be a PI in more than 3 projects submitted to the State Committee for funding. However there are no restrictions on researchers who have participated in the Soros program.

He verified that dollar inflation was beginning to erode the value of these grants and that current conditions do not provide for remediation of the crumbling infrastructure. The ISF and other programs promise no relief.

**2.11 Follow-up visit with members of the Coordinating Board for UPS, Kiev University:**

The first question addressed was IUPAP. The Board was unaware of the importance of the Union or of the details of membership, purpose, cost, adherence, etc. We promised to provide them with information and we urged them to push for the organization of a national committee. The issue was subsequently raised during talks with the President of the Academy.

Difficulties associated with the phase-out of the Matching Member Program were raised (over the past 2 years, journal distribution was subsidized with an NSF grant through the Matching Member Program and is now replaced with the Library Outreach Program funded by ISF). It was emphasized that whereas the MM distribution scheme was balanced, the current ISF distribution scheme was far from ideal. The principal interest was on insuring wide availability of *APS News* and *Physics Today*.

Because we decided not to abruptly halt the memberships, we sent letters to the matching members advising them that they would be permitted to continue their membership for the coming year but that journal distribution would cease (unless a sponsor could be found for 1-3 journals subscriptions). But because the matching members were selected for journal distribution, coverage was not considered equitable as far as university and institutional representation was concerned. We were asked if it would be possible to add 15 members to the list. We responded that this could be done if sponsors were found to bear the cost. The Matching Member Fund is limited and will not bear undue expansion.

Since the object of this discussion was primarily access to *Physics Today*, we informed them that the matter would have to be discussed with AIP to see if a solution could be found.

Andreev stated that the Board understood the problem and that UPS could not expect continuing subsidies. He asked if it would be possible to institute a program whereby initial membership fees would be modest, perhaps the cost of joining a Division or Topical Group, and would be gradually increased thereafter over a period of 3-5 years. We promised to examine the matter and to inform them of our views as to the propriety for such a program.

We then discussed the UPS program to develop telecommunications access. We pointed out that some telecommunications providers (operators of hosts such as Pinet) derive user fees to finance their operations and that this may be a possible avenue for them to pursue. But the major difficulty for UPS was a lack of technical expertise needed to develop such programs. In this aspect there may be a role for the UNESCO/PAC Working Group on Networking and Telecommunications.

We agreed that it was critical to convey to the government the importance of telecommunications.

Currently, ISF has access to store-and-forward email on a host node run by Technosoft (a company organized by the Cybernetics Institute). This service does not include telnet-mediated real-time access to the Internet. However, Technosoft is prepared to provide this service when UPS provides an appropriate domain server. The cost of the service is high by Ukrainian

standards but the blow is softened by a 40% discount. This issue was further pursued at talks with Technosoft, the Kiev UN office and ISF, and a scheme developed as discussed below.

A major concern of the Board is support for its newsletter, *Physical Messenger*. They want to improve the format and print quality and will submit a funding request to Soros' Renaissance Foundation office in Kiev.

### **2.12 Visit to the United Nations Office in Kiev for talks with the Deputy Resident Representative, Bogdan Lisovich, and members of his staff, September 1:**

The United Nations office in Ukraine inaugurated a program entitled, "Strengthening of Information and Communications Infrastructures for Democratic Reform (UKR/93/003)." Appendix 1 is the project brief for this program.

The heart of the project is the Pilot Network Program (PNP) which is described in Appendix 2 along with a statement of policy principles. Potential participants of the program were asked to draft memoranda of understanding proclaiming their adherence to the protocol for the network. Appendix 3 contains copies of such memoranda signed by the International Science Foundation (ISF) and the European Academic Research Network-Ukraine (EARN-Ukraine). Thus, the development of the network will be a shared responsibility among these three organizations.

Appendix 4 is a map of the developing network, indicating the network components and interconnections. In Kiev, the network is to be expanded into 6 education and research nodes to be installed and implemented by ISF. (This has been reduced to 4 nodes as a result of funding exigencies--see below.) The Ukrainian participants in these nodes will assign staff to operate and maintain the nodes. This staff will receive formal training in a joint UN-ISF course to be convened in the late Fall or Early winter.

The PNP map given in Appendix 4 gave rise to an immediate opportunity for both the UPS and the UNESCO/PAC Working Group on Networking and Telecommunications:

- The development of a node distribution "spine" in the cities of Kharkov and Odessa.
- Development of node-management expertise and participation in the UN-ISF program to be convened before the end of 1994.

The reasons for extending the networks in Kharkov and Odessa is due to the fact that network development in Kiev and Lviv are well advanced and only Kharkov and Odessa will have existing lines to an active domain. And since the physics community has a cadre of young computer-competent members, it will be relatively easy to continue the infiltration of special knowledge concerning the setting-up of nodes and providing for node maintenance. Those who will be the first trained will form the nexus of experience needed to train others on equipment either in place or being acquired.

The cost of expanding the network "spine" is nominal, requiring high-speed modems with multiple line inputs. Thus, for a modest expense of less than \$5,000, about 4 branches can be immediately installed in each city (for a total of 8 initial radiating branches). Lines (9,600 Baud) can be rented for the nominal rate of \$60/year. ISF will provide microwave links in Kiev to the major nodes.

UPS will have the responsibility for siting the modems and recruiting the institutional collaborators and staff. They have been encouraged to draft an appropriate memorandum of understanding by the end of September. WG2 will attempt to secure the needed funds for modem procurement from either the UNESCO budget or other outside sources.

The director of the UN PNP is Rafal Rogozinsky (also with IREX) and UPS will coordinate its participation with him.

### **2.13 Meeting with the President of the Ukrainian National Academy of Sciences, Boris E. Paton:**

Appendix 5 is a copy of a letter given to Academician Paton enumerating the points for discussion. These devolved on the oft-stated need for unambiguous tax-exemption for aid programs, the lack of coordination among a proliferating inventory of international programs, support within the government for a vigorous developmental telecommunications project, the importance of enlisting the grass-roots scientific community in efforts to salvage Ukrainian science, and the need for the Academy to formalize adherence agreements with the international scientific unions.

For the most part, Paton agreed to these points and was lavish in his praise of UPS programs and the support of APS.

### **2.14 Meeting at the Cybernetics Institute, Technosoft office, for talks with the head of the Network Department, Dr. Bursuk and members of his staff, September 2:**

Technosoft originated from the Center for Program Development of the Institute which previously served the needs of the State Committee for Science and Technology. But with the reduction in funding attending independence, the Institute organized Technosoft to acquire income. Technosoft is the principal provider of electronic telecommunications services for both commercial and academic groups. Thus, it is largely viewed as a commercial enterprise and as such will have difficulty meeting the PNP protocols.

However, Technosoft maintains that it does not charge fees to academic users but only passes along the charges of the carriers, primarily Relcom (the Russian community of users and providers which forms a co-op to administer services). As of now, Ukrainian academic users pay about 60% of that charged to commercial users. Relcom, however, sets the access rates. Academic users are largely restricted to the access of hosts for store-and-forward email service and not real-time telnet access to the Internet. This will soon change, however.

Technosoft began operations for the academic research community in 1990 when it provided Relcom service to the Institutes of Condensed Matter, Theoretical Physics and Microbiology and Genetics in Kiev.

With respect to its status as a commercial server, Dr. Bursuk argues that the funds received are used to underwrite operations, equipment and development costs. He pointed out that commercial data servers can only be purchased on credit, requiring cash flow from its operations. When they began operations, they had 1 computer and 3 4.4 kb modems. Now they manage a large TCP/IP and UUCP network with 10 major nodes throughout the country. They plan to expand to 20 nodes and provide telnet access to the Internet besides email delivery. Their current charges are \$50/month for a line. FTP/telnet services are provided to academic users free of charge but the traffic charge is established by Relcom.

The PNP and similar programs have effectively barred Technosoft from serving the academic community in Lviv since direct links already connect the university and institutes there. NSF, UN ISF and European programs are gradually displacing Technosoft in these areas.

**2.15 Visit to the Institute of Semiconductor Physics for talks with the Institute Director, Academician Svechnikov, and the UPS Chair of Summer Schools, Professor Valakh and other staff:**

The Institute employs a total of 800 staff of whom 471 are research scientists (71 Doctors of Science, 31 of whom are professors, and 213 Candidates).

There is a fabrication plant employing 230 workers. It manufactures devices and instruments for sale to industry and institutes.

The Institute has 7 divisions organized into 26 departments with 29      . There from 20 to 100 staff in each department. The divisions in the institute are devoted to theoretical physics, photo-electron research, semiconductor optics, surface physics and microelectronics, physics of pure crystals, semiconductor materials and opto-electronics.

Research is done on a variety of materials: silicon, germanium, porous silicon, etc.

In the years before independence, the Institute derived 50% of its budget from the Academy with the remaining coming from industry contracts. Now, industry can only provide 12%-13% of its needs, despite the fact that it is the major source for silicon materials and Gallium Arsenide in Ukraine.

Svechnikov estimates that  $\frac{1}{4}$  of the Institute must be preserved and his policy is to search for international sources to supplement the dwindling support.

In subsequent discussions with Valakh, we discussed the approach to organizing the joint US-

Ukraine Summer Schools committee. I informed him that I would provide source materials for funding applications to include copies of our NSF applications.

**2.16 Visit to ISF for talks with Viacheslav Shkarupin, Managing Director, and Yuri Demchenko, Technical Manager:**

As mentioned above, ISF only has funds for 4 nodes for the PNP and one of these will be installed at Kiev University. At the urging of UPS staff, this node will probably be installed in the UPS office at the University. The major problem for ISF is a small staff and inadequate numbers of experts to implement its training program as the nodes are procured and installed.

I suggested that WG2 could support the UN-ISF training program by securing the services of any additional 3 experts to participate in the one-week program of training and node implementation. This will be proposed to the members of WG2 prior to the UNESCO/PAC meeting in Cancun during CAM-94.

In addition, ISF is uncertain about whether it will receive an adequate discount from Cisco, for the routers it will need in the Kiev distribution network. They had received previous routers at a 40% discount and had budgeted for a 30% discount. I promised to contact Cisco on behalf of the UNESCO/PAC to see if the maximum discount would be provided. I will coordinate this inquiry with ISF staff in New York.

**3. Summary:**

As a result of this visit, action will be pursued in the following areas:

- An international coordinating committee will be organized to take responsibility for the planning, funding and administration of summer and winter schools.
- Attempts will be made to secure a more rational and balanced distribution scheme for journals provided by APS to ISF.
- UPS and WG2 of the UNESCO/PAC will submit memoranda of understanding to the UN Kiev office for participation in the PNP.
- UPS will be provided with directories of APS Unit leadership to facilitate inter-society communications

#### APPENDICES 1 THROUGH 5

- Appendix 1: Project Brief, "Strengthening of Information and Communications Infrastructures for Democratic Reform"
- Appendix 2: Pilot Network Project, Draft Statement of Intent and Policy Principles
- Appendix 3: Memoranda of Understanding (Ukraine-EARN, ISF)
- Appendix 4: PNP Implementation Plan
- Appendix 5: Letter to Boris E. Paton, President, Ukrainian National Academy of Sciences



# PROJECT BRIEF

*Title* ***Strengthening of Information and Communications Infrastructures for Democratic Reform*** (UKR/93/003)

*Description* Integration of Ukraine into the world community is fundamental to the country's progress in developing strong democratic institutions. Appropriate information and communications infrastructures are key to this process, but are at an incipient stage. Improvement in this area is impeded by an inadequate technological base and will not occur without external assistance. The aim of this project is to establish electronic data communications facilities and to set up an information network.

*Expected results* This project will directly strengthen the information and communication infrastructures in Ukraine, permitting Government agencies, academic institutions and NGOs to access United Nations databases, global data and electronic mail networks (e.g. Internet facilities) and computers operated by academic research centres. Users from outside Ukraine will also be able to access uniquely Ukrainian information (e.g. laws, research results, and commercial and technical cooperation data).

*Special features* Communications; information; strengthening of democratic institutions.

*UN rationale* The United Nations has access to a wide variety of information of various kinds. It is appropriate for the organization to promote the exchange of information between Ukraine and the Organization as well as among Ukraine and other Member States.

*Duration* January 1994 - January 1996

*Implementation* National execution

*Financing* UNDP: US \$235,000  
Government: US \$20,000

*Donor support* Bilateral support invited.

**UN/UNDP contact** Bogdan Lisovich  
United Nations Office, Kiev, Ukraine  
Tel: (7044) 293-9363 Fax: (7044) 293-2607  
E-mail: lisovich@nn.kiev.ua  
*or* Reinhart Helmke  
Director, Division for Europe and CIS, New York  
Tel: (212) 906-6597 Fax: (212) 906-6595  
E-mail: reinhart.helmke@undp.org

# Pilot Network Project

## Draft Statement of Intent and Policy Principles

### General Description

The Pilot Network Project (PNP) represents a institutionally derived consortium-based effort at creating a non-profit, non-commercial TCP/IP-based Internetwork linking institutions within Ukraine's academic, research, state, and non-governmental sectors with the global Internet.

The PNP is dedicated to providing full access to the global Internet for its member institutions including: communications services (e-mail, telnet), information resources (Usenet, ftp archives, electronic library systems, and electronic journals) and Internet navigation tools such as gopher, archie, veronica, jughead, WAIS, WWW and eventually Mosaic.

Primary support for developing internetwork resources and structure will be provided by EARN -- Ukraine and the United Nations Office in Ukraine who will secure free-of-charge international connections for the PNP. In addition, EARN and the UNO will provide direct technical support and guidance in assisting member institutions implement Internetwork technologies.

## Policy Principles

Membership in the PNP consortium is open to any institution, but is conditional on each institution meeting and strictly adhering to the following policy principles:

1) The PNP is a strictly non-commercial, not-for-profit undertaking. In this regard:

- No commercial usage of any kind is permitted or tolerated.
- No member institution may accept or seek payment for any informational resource or service received free of charge via the PNP.

Any institution found in breach of the above two policy points may be subject to exclusion from the PNP at the discretion of a majority vote (51%) of the remaining consortium members.

2) Member institutions must fully finance the operation of their sites including all related capital and a manpower costs.

3) International access for the PNP is provided by two main access sites located in Kiev (UNO) and Lviv (EARN) who guarantee free-of-charge access and for the duration of this agreement. In the case of the UNO, free-of-charge access is guaranteed under UN Project Ukr/93/004 "Strengthening Information and Communication Infrastructure for Democratic Reform".

4) Member institutions must fully finance the cost of leasing appropriate communications channels to the next closest site providing access to the international link sites.

5) Member institutions are required to contribute a one-time fee of \$100.00 (USD) to the institution through which they gain access to the international link site. Of this sum \$75.00 remains with the site to which the new member connects, and \$25.00 is transferred to the international link provider (EARN -- Ukraine). In both cases, the one time fee will be used to compensate for technical and manpower expenditures arising from connecting the new institutional subscriber.

6) The member institutions agree that the long-term viability and sustainability of the network will require an on-going financial commitment and thus resolve to urgently discuss and all questions arising from this issue.

7) This agreement is valid until June 1995, and may be renewed thereafter by a majority vote of consortium members. Prior to June 1995, this agreement may be modified only upon the agreement of 75% of consortium members.

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE  
UNITED NATIONS DEVELOPMENT PROGRAMME  
AND THE  
INTERNATIONAL SCIENCE FOUNDATION  
FOR THE ESTABLISHMENT OF THE  
UKRAINIAN ACADEMIC AND RESEARCH NETWORK

The United Nations Development Programme (UNDP), represented by the United Nations Office in Ukraine (UNOU) and the International Science Foundation (ISF), represented by the International Science Foundation in Ukraine (ISFU), declare their intention, within the framework of existing programmes and projects, to coordinate their efforts, along with the efforts of other interested parties, directed towards the creation of an operational academic, government and educational network in Ukraine.

On the basis of consultations between UNDP and ISF, the following understanding was reached:

1. UNOU and ISFU shall coordinate their efforts to the greatest possible extent in connection with the creation of an Internet Protocol (IP) backbone on the basis of the following division of tasks and responsibilities:

- UNOU will secure external unrestricted (international) access from the IP backbone in Kiev. To this end, UNOU will establish a satellite link, cover data traffic costs for an initial two-year period, and provide organizational/technical support for access to the Internet, making available up to \$235,000 for this purpose under UNDP project UKR/93/004, "Strengthening of Information and Communications Infrastructures for Democratic Reform".
- ISFU will fund the establishment of a network infrastructure in Kiev. Initially, a distributed IP network shall be created which will accommodate six academic/educational clusters/nodes, with funding set at not less than \$500,000.
- In the framework of the above projects ISFU and UNOU have the intention to finance an information and training centre for users and specialists and, as a next stage, to consider the possibility of establishing of an appropriate infrastructure for the most scientifically and technologically developed regions of Ukraine.

2. UNDP and ISF have the intention to approach other international donors, and to assess their proposals regarding funding and resources for the extension/expansion of the IP-network and for providing its informational resources.

3. UNOU and ISFU declare their readiness to coordinate work relating to the creation of an IP backbone taking into account existing programs of academic and educational networks development in Ukraine.

4. UNOU and ISFU put forward the proposal of creation of the Association of Academic and Educational Computer Networks in Ukraine which will link all interested organizations and experts who are engaged in funding and development of computer networks or use the services provided by the network.

5. UNOU and ISFU declare their intention to ensure the non-commercial nature of the above-mentioned network. To this end, and to ensure the proper use of the material and other resources of the above-mentioned network, UNOU and ISFU will establish a Board of Trustees. The actions of the Board of Trustees shall be governed by resolutions and agreements adopted jointly by UNOU and ISFU. UNOU and ISFU shall each designate two representatives to the Board of Trustees. Initially, membership in the Board of Trustees shall be open to other sponsoring organizations. Chairmanship of the Board of Trustees shall rotate between UNOU and ISF.

In future, after the establishment of the network and the resolution of questions relating to self-sustainability and non-commercial operation, such rights may be granted to the Association of Users of Academic and Educational Networks in Ukraine.

6. During the period of the network's establishment, the equipment and software made available for the programme shall remain under the control of the sponsoring organizations or under the control of organizations designated by the sponsoring organizations and shall be managed by the Board of Trustees.

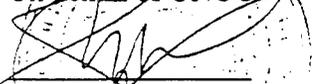
7. The main aim of the creation of the network is to ensure access by academic, scientific and humanitarian organizations in Ukraine to information computer networks abroad - that is, those comprising the Internet - on a non-commercial basis.

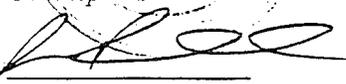
8. UNOU and ISFU shall examine the feasibility and desirability of connecting to the IP network commercial organizations providing general connectivity services, including charging policy. UNOU and ISFU shall implement means of distinguishing between commercial and non-commercial traffic on the network.

9. To ensure the implementation of the programme, a temporary group of technical experts shall be established, managed jointly by UNOU and ISFU, which, reporting to the Board of Trustees, shall install software and equipment for the main Kiev network and the main sub-nodes elsewhere in Ukraine. During the project's first phase, organizations requesting connectivity shall make available personnel to service and operate their sub-nodes. The group of technical experts shall provide training to persons engaged by those organizations to maintain network systems.

10. Details of cooperation will be defined in a Cooperation Agreement between ISFU and UNOU

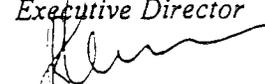
On behalf of UNOU

  
Steven Browne,  
UN Representative

  
Rafal Rogozinsky,  
Project Coordinator,  
UN Internet Project

On behalf of ISFU

  
Natalia Artukhovskaya,  
Executive Director

  
Viacheslav Shkarupin,  
Managing Director

12.07.94

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE UNITED NATIONS DEVELOPMENT PROGRAMME  
AND THE EARN-UKRAINE  
FOR THE ESTABLISHMENT OF THE UKRAINIAN ACADEMIC AND  
RESEARCH NETWORK

The United Nations Development Program (UNDP), represented by the United Nations Office in Ukraine (UNOU) and the Ukrainian Division of the European Academic and Research Network (EARN-Ukraine), represented by the Institute of Condensed Matter Physics of the Ukrainian Academy of Sciences (ICMP), declare their intention, within the framework of existing programmes and projects, to coordinate their efforts, along with the efforts of other interested parties, directed towards the creation of an operational academic, government and educational network in Ukraine.

On the basis of consultations between UNDP and EARN-Ukraine, the following understanding was reached:

1. UNOU and EARN-Ukraine shall coordinate their efforts to the greatest possible extent in connection with the creation of an Internet Protocol (IP) backbone on the basis of an international programme within frameworks of which the following integration of tasks and responsibilities is envisaged:

- UNOU will secure external (international) access from the IP backbone in Kyiv. To this end, UNOU will establish a satellite link, cover data traffic costs for an initial two-year period and provide organizational/technical support for access to the Internet, making available up to \$235,000 for this purpose under UNDP project UKR/93/004, "Strengthening of Information and Communications Infrastructures for Democratic Reform".

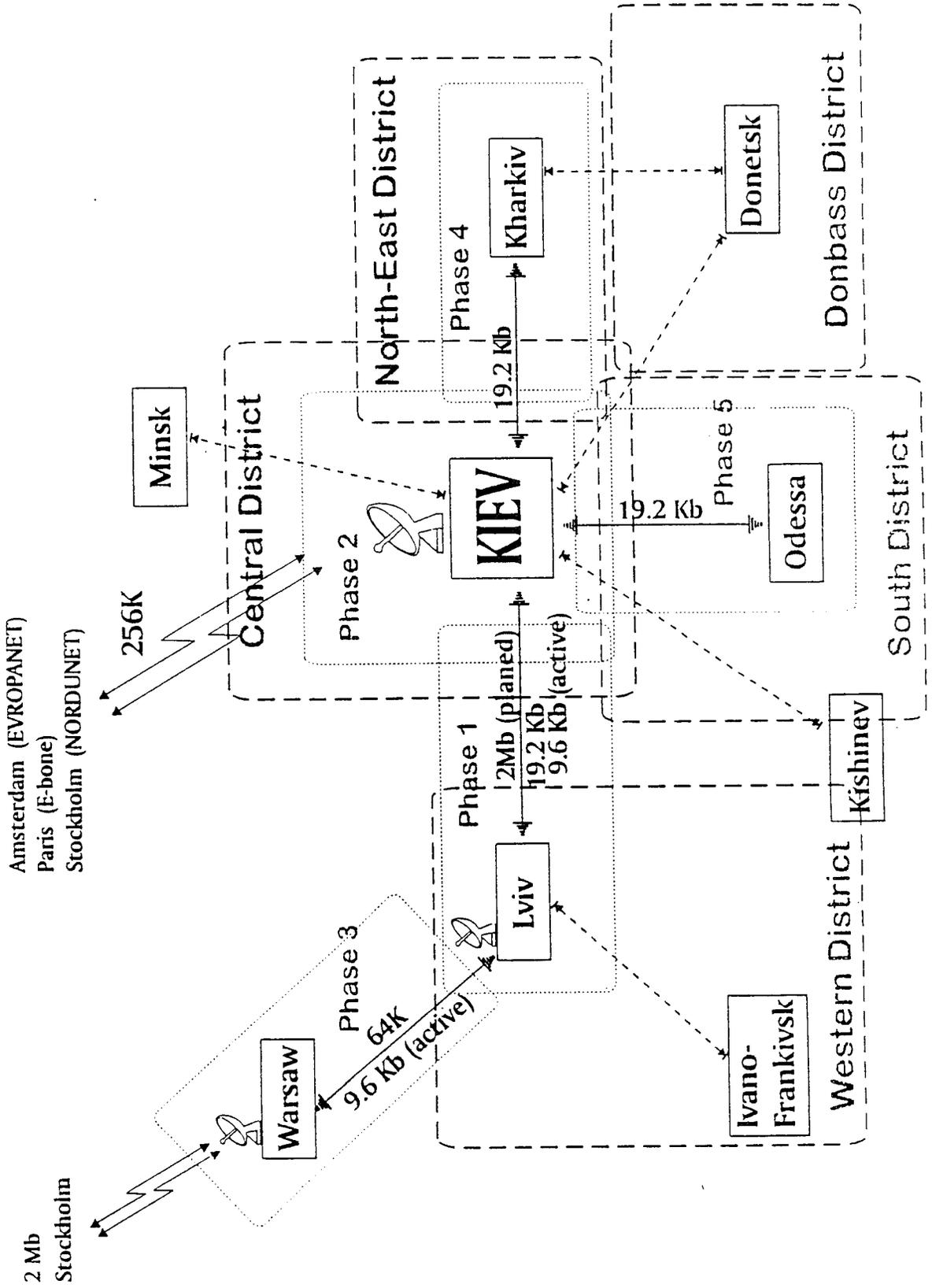
- EARN-Ukraine, in cooperation with Polish Academic and Research Network (NASK) and Austrian Academic and Research Network (ACONET) will establish a satellite link between Lviv and Warsaw (main Polish country node).

- Both international access points will be interconnected with a fast IP link providing the reliable reserved international connectivity for Ukraine.

- UNOU and EARN-Ukraine will cooperate in establishment of two network training centers in Kyiv and Lviv to provide the training facilities for network operators and end users.

- Both parties will share their technical experience and expertise to facilitate the most efficient development of Internet in Ukraine.

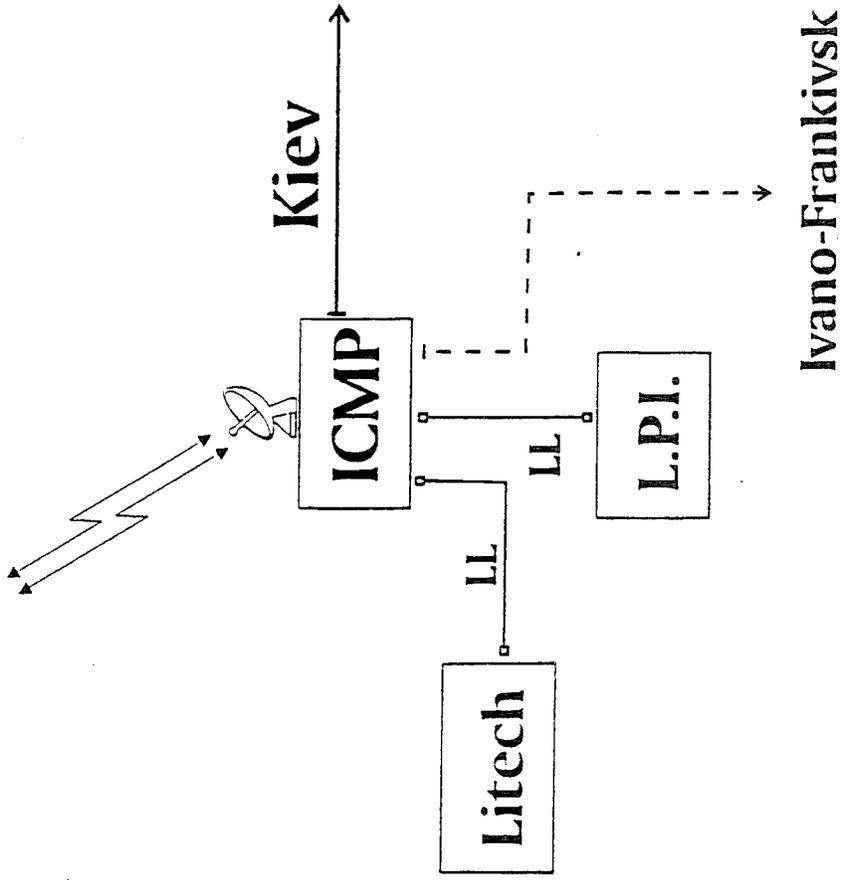
# Pilot Network Project (Implementation Plan)



## Western District (backbone nodes)

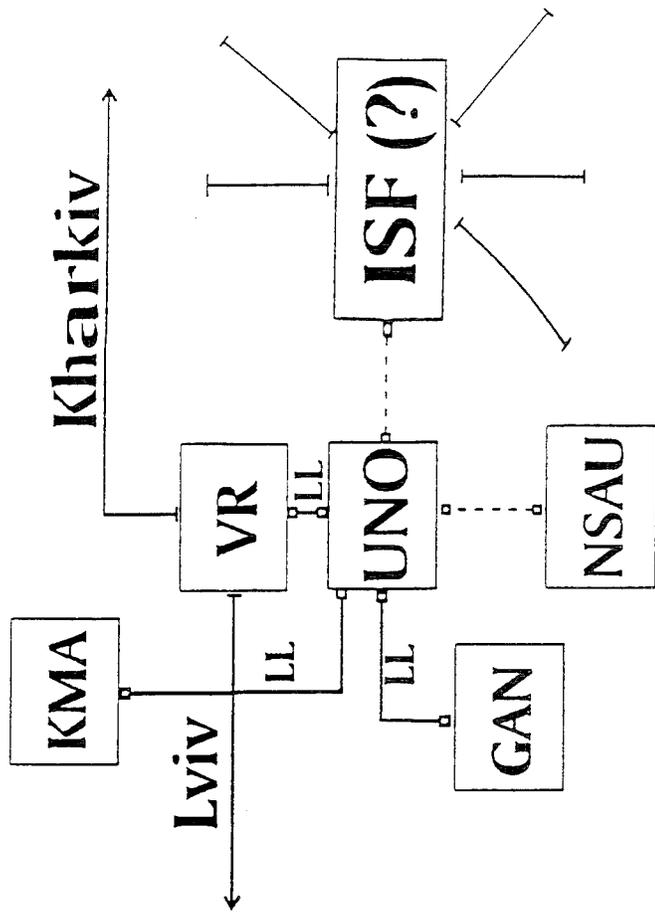
contact: Dr. Alexander Saban  
saban@sigma.icmp.lviv.ua

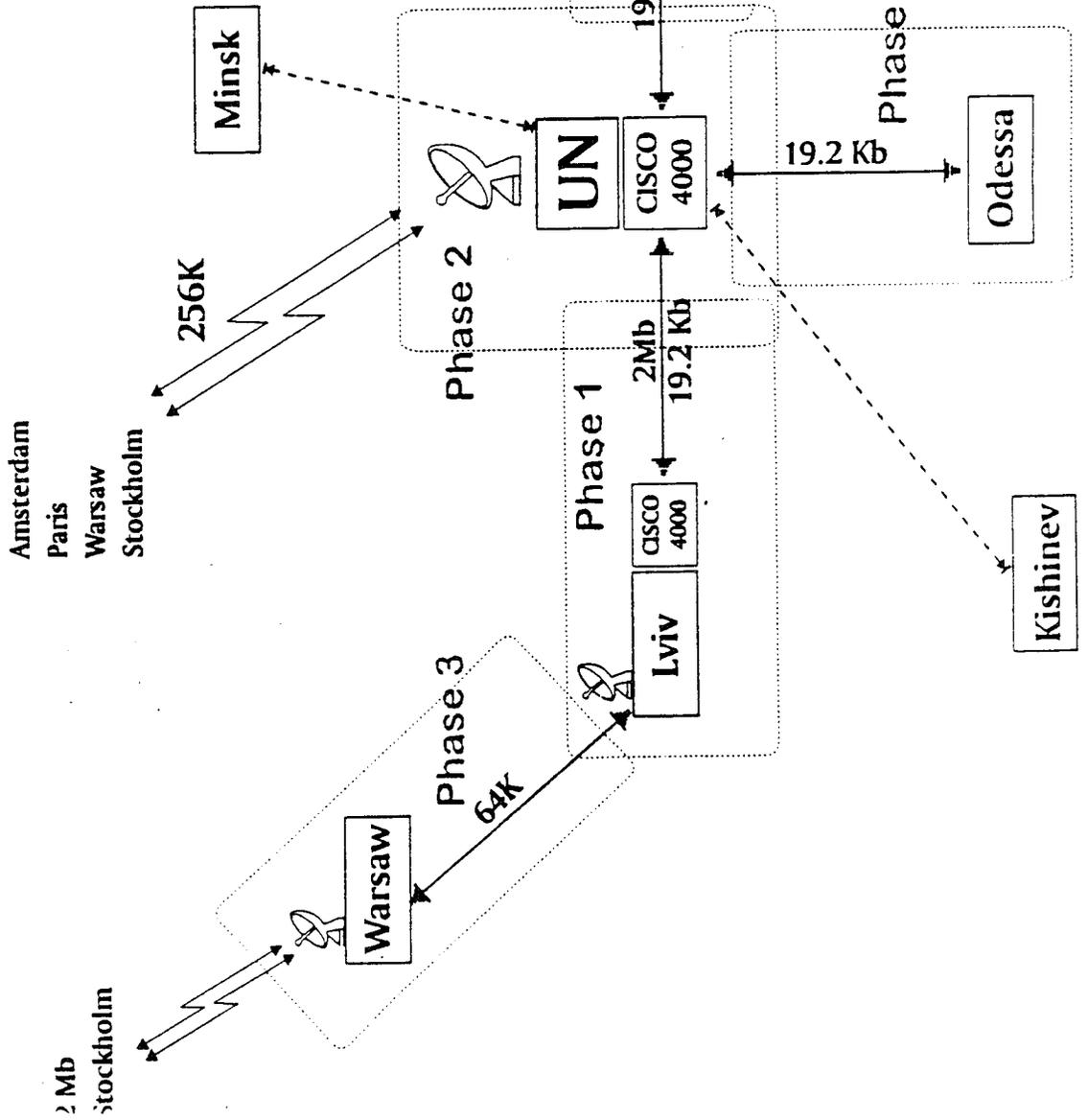
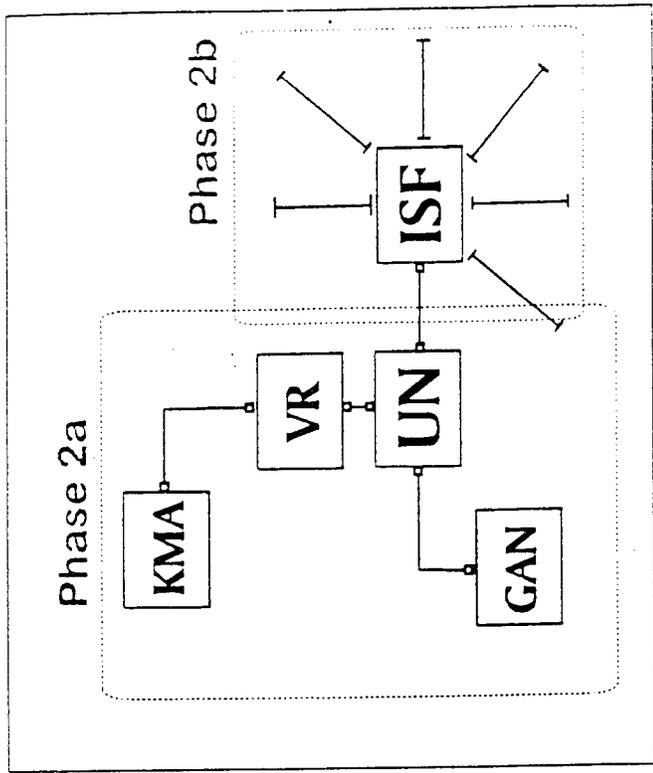
2 Mb  
Stockholm



## Central District (backbone nodes)

contact: Rafal Rohozinski  
rafal@un.kiev.ua  
rafal@gluk.apc.org





# The American Physical Society

One Physics Ellipse, College Park, Maryland 20740-3844 (301) 209-3200

**President**  
**Burton Richter**  
*Stanford Linear Accelerator Center*

September 1, 1994

**President-Elect**  
**C. Kumar Patel**  
*University of California, Los Angeles*

Academician Boris E. Paton  
President  
Ukrainian National Academy of Sciences

**Vice-President**  
**J. Robert Schrieffer**  
*National High Magnetic Field Lab  
Florida State University*

Dear Academician Paton:

**Executive Officer**  
**Judy R. Franz**  
*University of Alabama, Huntsville*

We are a delegation of the American Physical Society (Professor Judy R. Franz, the Executive Officer, Professor Irving A. Lerch, Director of International Affairs, and Doctor George Gamota, Director of the Mitre Institute and member of the APS Task Force on the former Soviet Union).

**Treasurer**  
**Harry Lustig**  
*City College of The City  
University of New York—emeritus*

We extend our greetings and those of the officers of the American Physical Society to you and the venerable Academy which you lead.

**Editor-in-Chief**  
**Benjamin Bederson**  
*New York University—emeritus*

**Office of Public Affairs**  
**Robert Park**  
*University of Maryland*

We are here to consult with our colleagues in the Ukrainian Physical Society and to visit the summer schools, Academy institutions and universities of your country in order to assess the value of our joint efforts. But more importantly, we are here to discover what we can do together to secure the recovery and success of vigorous Ukrainian physics research and education within the international physics enterprise. We seek to share our thoughts with you and to solicit your advice and counsel.

As you know, we have worked closely with our colleagues in Ukraine, especially with the officers and committees of the UPS with whom we have had a Reciprocal Member Agreement since 1993. The Ukrainian Physical Society has rendered valuable service in assisting us to administer many hundreds of emergency grants, to design and implement a much-needed journal distribution program and to organize several summer schools to carry on the traditions of Ukrainian physics. In addition, APS played a central role in the organization and planning of George Soros' International Science Foundation. APS-supported physics panels in the ISF program have processed almost 8,000 long-term grant applications from all over the former Soviet Union and we have extended our journal distribution program by providing the Soros program with thousands of copies of our journals.

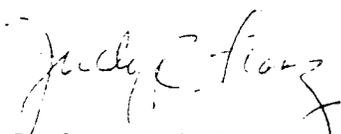
During our many discussions, the following issues have emerged as being of great importance:

- The 1993 decree of President Kuchma (when he was Premier) providing for the tax-exemption of humanitarian grants given to scientists is not fully recognized by all authorities as covering such activities as summer schools and foreign travel grants.

- We are concerned that not enough attention is paid to coordinating international efforts in support of basic research. The duplication of effort and subsequent waste threatens to diminish our joint efforts.
- We wish to emphasize the vital need for electronic telecommunications as a central medium in the dissemination of scientific information and discourse. We urge the Academy to take a constructive role in urging government support for electronic telecommunications.
- We commend to the Academy the enlistment of the grass-roots scientific community as represented by such organizations as the Ukrainian Physical Society. It is our belief that such organizations can play a constructive and essential role in the planning and implementation of vital programs.
- We urge the Academy to seek an active role in the international system of scientific unions and to enlist the help of the Ukrainian physics community in representing its interests in the International Union for Pure and Applied Physics (IUPAP).

We wish to assure you and the Academy of our deep respect for Ukrainian science and to stress that the international community would be impoverished without a dynamic and productive Ukrainian physics community. We fully appreciate the many contributions that Ukrainian physics has and will continue to make to the cultural and economic life of your country.

With our best wishes,



Professor Judy R. Franz



Professor Irving A. Lerch



Doctor George Gamota

**II. SCHOOL ANNOUNCEMENT  
AND REPORT BY ORGANIZER V. EREMENKO**

**Official announcement:**

ISSM'94  
THE INTERNATIONAL SUMMER SCHOOL ON MAGNETISM  
(August 29 - September 5, 1994)  
"Kommunalnik" Holiday Hotel, Kharkov Region, Ukraine

-----  
School Secretariat: 47 Lenin Ave., Kharkov 310164, UKRAINE  
Phone: 7-0572-320468 Fax: 7-0572-322370 E-mail: school@ilt.kharkov.ua

ISSM'94 is organised jointly by the Ukrainian Physical Society and the American Physical Society and the Institute for Low Temperature Physics & Engineering (ILTP, Kharkov, Ukraine).  
The aim of the School is to promote understanding of modern problems in physics of magnetism using the experience and knowledge of lecturers of the international standards. Sessions will include invited lectures (up to 1.5 hours), oral reports (up to 30 min) and round-table discussions.

**Topics of ISSM'94**

The School will be a forum to discuss the state of fundamental researches and last experiments in some major topics of magnetism, which are of current interest. The field covered by the programme include magnetism of low dimensional systems, magnetic excitations (magnons, solitons), magnetic domains, magnetic interactions and ordering, critical phenomena and phase transitions.

**Dates & location**

August 29 - September 6, 1994. "KOMMUNALNIK" Holiday Hotel (60 km >from Kharkov), Kharkov Region, Ukraine.

**Official language - English**

**Expected number of participants - 80**

**The list of invited lecturers**

Victor G. BARYAKHTAR (Kiev, Ukraine)  
Alan R. BISHOP (Los Alamos, USA)  
Andrey S. BOROVNIK-ROMANOV (Moscow, Russia)  
Victor V. EREMENKO (Kharkov, Ukraine)  
Boris FILIPPOV (Ekaterinburg, Russia)  
Boris A. IVANOV (Kiev, Ukraine)  
Aleksander S. KOVALEV (Kharkov, Ukraine)  
August H. MAKI (California, USA)

Saul OSEROFF (San Diego, USA)  
Sergey M. RYABCHENKO (Kiev, Ukraine)  
John C. SLONCHEVSKI (New York, USA)  
John M. TRANQUADA (New York, USA)  
Philip E. WIGEN (Ohio, USA)

School and Programme Chairman - Victor V. EREMENKO

ISSF'94 ORGANIZING COMMITTEE:

Prof. Aleksander G. ANDERS (Inst.Low Temp.Phys.& Engin., Ukraine)  
Prof. Victor G. BARYAKHTAR (Inst. Metal Phys., Ukraine)  
Dr. Valerian S. BOROVIKOV (Inst.Low Temp.Phys.& Engin., Ukraine)  
Prof. Victor V. EREMENKO (Inst.Low Temp.Phys.& Engin., Ukraine)  
Dr. George GAMOTA (MITRE Inst., Massachusets, USA)  
Dr. Nikolay I. GLUSCHUK (Inst.Low Temp.Phys.& Engin., Ukraine)  
Dr. Irvin LEARCH (American Physical Society, NY, USA)  
Prof. Yuriy A. POPKOV (Kharkov State Univ., Ukraine)  
Prof. Sergey M. RYABCHENKO (State Committee of Sci.& Techn., Ukraine)  
Prof. Philip WIGEN (Ohio State Univ., USA)

## Report by Ukrainian Organizer V. Eremenko:

### International Summer School on Magnetism (ISSM'94)

The International School ISSM'94 was held to strengthen further the scientific and working contacts between the Ukrainian and American physical communities. The school was arranged by the Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine. The Organizing Committee headed by Academician V. Eremenko formulated the range of current problems in physics of magnetic phenomena and invited well-known scientists from the USA, Ukraine and Russia to lecture on these topical problems. Besides, many noted specialists gave talks on recent studies in particular fields referring to magnetic media. Young researchers and postgraduates who made the body of the school students had the possibility to inform the participants about their results in posters.

The subject of the lectures was of a wide range. Prof. P. Wigen (Ohio State Univ.) and Prof. J. Slonchewski (IBM Res. Center, NY) spoke about the problem of multilayered systems which are now being studied intensively. The lectures of Academician V. Baryakhtar (Inst. of Met. Phys., Kiev) and the second lecture of Prof. P. Wigen were devoted to stationary and non-stationary nonlinear processes and excitations in magnetics. Due attention was given to quasi-one-dimensional systems in the lecture of Academician V. Eremenko dealing with exciton excitations and in the lecture of Prof. P. Schlottmann (Florida State Univ. Tallahassee) concerning two-band models in strongly correlated conducting chains. The features of spin-spin interactions in magnetics related to the long-range interactions were discussed by A. Anders, Dr. of Phys. & Mathem. (Inst. for Low Temp. Phys. & Eng., Kharkov). Dr. J. Tranquada (Brookhaven Nat. Lab.) devoted his lecture to the specific features of the spin and charge ordering in high-T superconductors and their non-superconducting analogs. Academician A. Borovik-Romanov (Inst. Phys. Probl. RAN, Moscow) talked about the magnetic properties of non-traditional magnetic media such as He and biophysical objects, respectively.

The oral reports are arbitrarily subdivided into three subject groups. One of these was concerned with the results of the researches into magnetic properties and spectra of elementary magnetic excitations of HTSC compounds and their nondoped analogies (V. Loktev, Inst. Theor. Phys., Kiev; Yu. Pashkevich, Phys. Tech. Inst., Donetsk; A. Belyaeva, Inst. for Low Temp. Phys. & Eng., Kharkov) as well as high-anisotropy magnetic dielectrics (E. Khatsko, Inst. for

Low Temp. Phys. & Eng., Kharkov). The second group of the reports concerned the investigations of specific features of magnetism and phase transitions in conducting magnetic substances (A. Beznosov, Inst for Low Temp. Phys. & Eng., Kharkov; A. Hjelm, Uppsala Univ.; V. Uzdin, State Univ., St.-Petersburg; E. Gomonay, Inst. of Met. Phys., Kiev). And finally, the reports of the third group presented theoretical data on phase diagram, critical phenomena and magnetic resonance in magnetically concentrated and magnetically dilute structures (A. Filippov, Phys. Tech. Inst., Donetsk; Yu. Pereverzev, A. Zvyagin, V. Popov, Inst. for Low Temp. Phys. & Eng., Kharkov).

The post reports reflected a wide range of modern trends in theoretical and experimental research of magnetism. Among these were the studies into magnetic ordering and magnetic phase diagram; domain and domain wall properties in magnetically ordered states of ferro- and ferrimagnetics; specific features of magnetism of metals and magnetic alloys as well as calculations of their band energy structures and resonance excitations. It should be noted that the study into magnetic properties of superconducting system of both high-T and novel unconventional materials is still in progress, and the interest in low-dimensional models of magnetism is awakened both in theory and experiment.

About 70 representatives of the known scientific centers of Kharkov, Kiev, Moscow, St.-Petersburg, Donetsk, Ekaterinburg involved in studies on magnetism have participated in the School. A great number of personal contacts and discussions by all the participants allow a hope for new constructive ideas in research of magnetic materials that may promote future progress in this field.

The Organizing Committee of the ISSM'94 and the Institute for Low Temperature Physics and Engineering are grateful to the American Physical Society, the Ukrainian Physical Society and the Presidium of the National Academy of Sciences of Ukraine for their assistance in overcoming organizational problems, as well as to the International Science Foundation for the financial support given to the School participants.

### **III. REPORTS BY ARO-SPONSORED PARTICIPANTS**

12 September 1994

**International Summer School on Magnetism 1994**  
**Kharkov, Ukraine**  
**Critical Appraisal-August H. Maki**

I was rather surprised to have been invited to lecture at ISSM 94, especially when I learned the identity of the other lecturers, and their fields of expertise. Their fields were very different from mine. The participants in the School were basically solid state physicists whose interests and training dealt with collective phenomena of magnetism-ferromagnetism, antiferromagnetism, domain structures, magnetic sublattice architecture, and the like. These phenomena rely on interactions between exchange-coupled magnetic centers. These areas are rather unfamiliar to me, a physical chemist whose research deals with isolated non-interacting paramagnetic triplet states (often in biological molecules), and their study by optically detected magnetic resonance (ODMR). Because of the limited overlap between my scientific experience, and the experience of the other participants, I am unable to give a critical evaluation of the science presented at the School. Most scientific conferences, or schools, in which I have participated have included a lecture whose subject was far removed from the main stream. I came to the conclusion that this was to be my role at ISSM 94, although no one ever told me this directly. Certainly, based on my scientific record, no one could have expected me to give a coherent lecture in ferromagnetic resonance, for instance. They would hear, in stead, "Some applications of ODMR in biophysics"; I would do my best to make scientific connections as well as distinctions between this subject and the concepts that I heard discussed by other lecturers at the School. The potential was present for a miserable experience for me, since I did not know anyone at the conference, nor did I share enough background to be able to "talk science" with anyone. Fortunately, the School was, in fact, a very enjoyable experience for me. This was due largely to the warm, outgoing nature of the Ukrainian and Russian physicists at the School, that of my American colleagues, and the fact that there are many other interesting things in life to discuss besides magnetism.

An aspect of the program administration that I can comment on most favorably is the reception of the American participants in Kiev and their transfer to Kharkov by overnight train. This was handled admirably by Dr. Alexander Kazachkov of ILTP who

met us at Borispol Airport, saw to our needs in Kiev, arranged some sightseeing, and accompanied us to Kharkov on the train. We were cared for extremely well throughout our visit. Prof. Eremenko was our host in Kharkov where we visited ILTP and were introduced to some of the recent research by the staff, including Prof. Anders who had done much of the actual preparation and organizing of the School. I was made to feel quite at home; the research presentations were interesting, although out of my area of expertise. The facility of the research presenters with English was quite variable. Practice with English language presentation should be encouraged; the younger scientists appear to have a better mastery of English than the older ones, in general. Prof. Eremenko was our host in Kiev again at the end of the school. I and my two remaining American colleagues, Drs. Wigen and Tranquada, (Drs. Schlottmann and Slonchewski had left earlier) were given a most interesting tour of Kharkov, and we had an opportunity to shop for Ukrainian art and crafts. The hotel chosen for us, The Kievskaya, was clean and very comfortable. On Monday afternoon, September 5, Prof. Avdeenko became my host. His research is most closely related to mine of any of the research groups at ILTP. I had hoped to be able to engage in some extended discussions with him at the School, but unfortunately personal considerations prevented Prof. Avdeenko from attending. He had arranged a visit to the Institute for Problems of Cryobiology and Cryomedicine at my request, where I was able to discuss my work and the work of the Institute with Dr. Oleg Nardid. The discussion was continued for a few hours in my room at the Kievskaya over some beers after the closing of the Institute. This was a very scientifically rewarding experience for me. On Tuesday, my final day in Kharkov, I had interesting research discussions with Prof. Avdeenko's research group at ILTP. From the viewpoint of science, these two days in Kharkov were the most rewarding. I enjoyed a wonderful visit and dinner with Prof. Avdeenko's family Tuesday afternoon before leaving for Kiev that evening. On Wednesday, Prof. Andreev was our (Dr. Tranquada and me) host in Kiev. Prof. Andreev and I share some common research interests and we had very stimulating discussions as a result. Prof. Andreev is centrally involved in the publication of the "Physical Messenger", a periodical of the Ukrainian Physical Society. I think that such a publication is a good idea; I note that some sections are written in English, but most is in Ukrainian. It is my opinion that thought should be given to publishing the "Physical Messenger" entirely in English, the international language of science, in order that it more effectively advance physics communication between Ukraine and the West. Prof. Andreev very kindly accompanied me to Borispol for my journey back to the States. It is impossible to overstate the thoughtfulness and courtesy shown to me by my Ukrainian hosts, some of whom have been mentioned above. Now to the school itself.

The ISSM 94 was divided into major (1-1/2 hour) presentations that were given in the morning, and shorter (1/2 hour) presentations that were given in the afternoon. On three of the afternoons, poster presentations were made in place of the short talks. There were no parallel sessions, so everyone could go to each talk/poster session. The general pace of the School was quite leisurely. There was opportunity for swimming and even sailing in the lake. The site of the School (Holiday Hotel "Vesna") was pleasant and conducive to leisurely discussions among the participants (although some of us were a bit concerned with the continuous arcing of the high tension wires above). The auditorium in which the talks were given had rather bad acoustic properties so that it was often difficult to hear the speakers above the sound of the fan in the overhead projector. A backup projector was ever present in case of need, which did present itself on occasion. Other than the acoustics, there were no serious technical problems during the school. In the future, more attention should be paid to acoustics and the size of the lecture hall (that at the "Vesna" was much too large for the number of participants). I mentioned above that there was little overlap between my background and that of the other participants. In spite of this, I enjoyed and got much out of the presentations of Prof. Borovik-Romanoff and Prof. Filippov, who gave very lucid presentations; they gave excellent examples of fine experimental and theoretical accomplishments, respectively. Among the Americans, Prof. Philip Wigen was truly the "live-wire" of the school. His scientific presentations were excellent and eagerly awaited (he gave two on science-substituting for Dr. Kovalev for one of them-and one on the American higher educational system and how to apply for graduate schools in the U.S.). His interactions with the Ukrainian and Russian participants were clearly seen to be friendly and genuinely helpful. He is an excellent representative of the U.S. in the FSU. Among the Ukrainian participants, I would like to single out Dr. Vadim Loktev as the most active member of the School. He participated vigorously in every presentation and added immeasurably to the level of the discussions. He truly kept the speakers on their toes; there should be someone like him at every School/conference. My major criticism of the organization of the School lies in the choice of major speakers. Too many of the major speakers were chosen from among the old-timers rather than from among the younger scientists, whose ideas are perhaps somewhat fresher and more varied. As a suggestion for future schools, a mix of more established and younger physicists should be chosen for the major presentations. In this way, the subject matter of the school might also become less monolithic, allowing for the discussion and development of more current and varied research areas.

Lecturer's Report on the International Summer School on Magnetism  
(ISSM '94).

lecturer: J. C. Slonczewski, IBM Corp.

school date: 29 August- 5 Sept., 1994.

location: "VESNA" Holiday Hotel, Kharkov Region, Ukraine.

The school directors did an excellent job with the practical arrangements for the invited lecturers in spite of the difficulties inherent in a new country suffering from enormous economic hardship. Our housing at the School (held at a vacation site) was rudimentary but adequate. The food was more than ample and quite tasty. An exceptional bit of worry was my 12-hour return trip alone by night train from Kharkov to Kiev, which I have been told is dangerous for a non-Russian-speaking person. (Actually, the trip turned out to be comfortable and uneventful.)

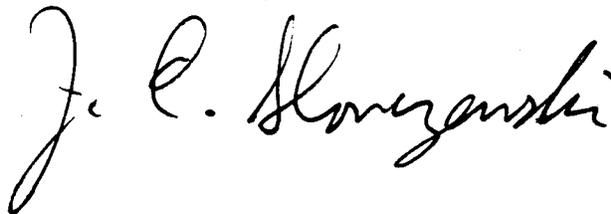
Pedagogically the School was more of a mini-conference with most of the invited lecturers and all of the others presenting either their most recent results or surveying a large part of their career results. Notable exceptions were P. Wigen and A. Borovik-Romanov who gave genuinely pedagogic presentations. (I cannot comment on the last afternoon of the School which I had to skip.) The poster program was rather chaotic with many announced papers omitted and previously unannounced presentations inserted.

From my personal scientific point of view, I benefitted from some valuable contacts. Over many years, I have been aware of much work of interest to me in the theory of magnetic solitons and loss mechanisms done in Russia and Ukraine. (This work is little appreciated in the West because of the travel restrictions from which Soviet scientists suffered in the past. Now they just lack money.) But I had little personal contact with the Russian workers themselves and none at all with the Ukrainians. Even the many magnetism conferences I attended in Poland were not attended by physicists from the neighboring brotherly Socialist republic of Ukraine! But at this School at last I was happy to meet some of these people, especially V. Baryakhtar and B. Ivanov, who have contributed much to loss-mechanism and soliton theories. I have some expectation of using their results in work I am planning on the physics of small-scale magnetic-recording heads.

I had an interesting visit to the Berkin Institute of Low Temperature Physics and Engineering (V. Eremenko, director) in Kharkov. It was interesting to hear about their attempts to become more relevant and market oriented, which echo the concerns in my own lab, IBM Research. My impression is that they have a long way to go! They seemed to celebrate the drastic reduction in development staffing as a result of the de-emphasis on missile work, imagining that this could mean more emphasis on basic research. My own guess is that the opposite may result, because in IBM we are accustomed to the necessity of a 10-to-1 staffing ratio between development and research for economic viability of the integrated research-development-manufacturing enterprise. Also, their specific advanced tech projects aim too exclusively at very small low-temperature markets. I introduced my lecture with a depiction of the technology flow through the IBM Corporation. (Most of my talk was on the fundamental physics of exchange coupling in magnetic multilayers, however.)

My visit to Prof. Andreev at Kiev University was interesting. He and his associates are very enthusiastic about the opportunity provided by the unaccustomed freedom for Ukrainian physicists to set up their own Physical Society from the grass roots upward. They were also enthusiastic about their bilingual Newsletter and rapidly expanding contacts with the West via e-mail.

J. C. Slonczewski 20 Sept., 1994.

A handwritten signature in cursive script, reading "J. C. Slonczewski". The signature is written in black ink and is positioned below the typed name and date.